

CLAIMS

1. A casting die (12) made of a steel material,
wherein a compressive residual stress of a cavity surface is
5 larger than 1000 MPa, a maximum height (Ry) is not more than
16 µm, and a nitrided layer (32) is provided at a surface
layer of said cavity surface.

10 2. The casting die (12) according to claim 1, wherein
a Vickers hardness of said cavity surface is not less than
700, a thickness of said nitrided layer (32) is not less
than 0.03 mm, and said steel material is alloy tool steel.

15 3. The casting die (12) according to claim 1, wherein
a Vickers hardness of said cavity surface is not less than
700, a thickness of said nitrided layer (32) is not less
than 0.1 mm, and said steel material is chrome molybdenum
steel.

20 4. The casting die (12) according to any one of
claims 1 to 3, wherein said compressive residual stress of
said cavity surface is larger than 1200 MPa, and said
maximum height (Ry) is not more than 8 µm.

25 5. The casting die (12) according to any one of
claims 1 to 4, wherein said nitrided layer (32) contains
iron sulfide.

6. A surface treatment method of a casting die (12) made of a steel material, comprising applying a shot peening treatment and a nitriding treatment to at least a cavity surface of said casting die (12) so that a maximum height (R_y) of said cavity surface is not more than 16 µm, and a compressive residual stress is larger than 1000 MPa.

7. The surface treatment method of said casting die (12) according to claim 6, wherein said nitriding treatment is performed after applying said shot peening treatment.

8. The surface treatment method of said casting die (12) according to claim 7, wherein said shot peening treatment is carried out again after applying said nitriding treatment so that said maximum height (R_y) of said cavity surface is not more than 8 µm, and said compressive residual stress is larger than 1200 MPa.

9. The surface treatment method of said casting die (12) according to any one of claims 6 to 8, wherein said nitriding treatment is a sulphonitriding treatment or a gas nitriding treatment by using nitriding gas.

10. The surface treatment method of said casting die (12) according to any one of claims 6 to 9, wherein said surface treatment method is applied to said casting die (12) having been used for casting operation.